

[54] **FLUSH VALVE ASSEMBLY**  
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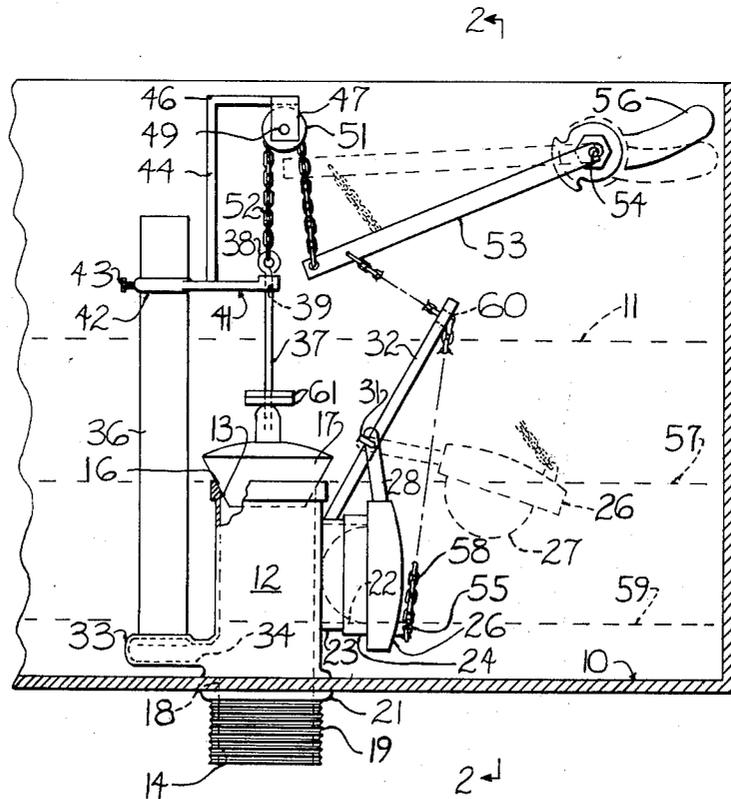
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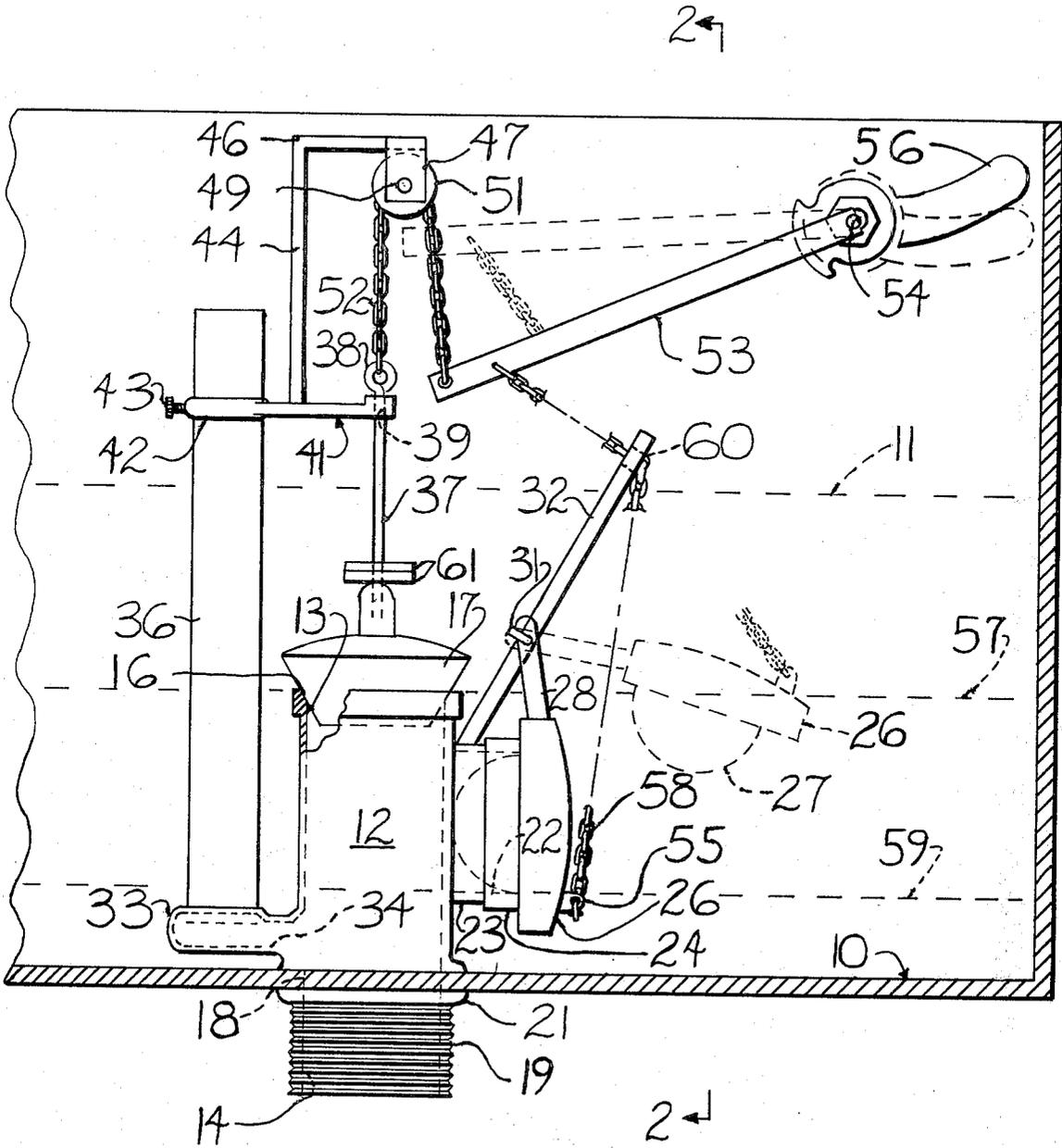
[52] U.S. Cl. .... 4/67 A; 4/67 R; 4/34; 4/57 P  
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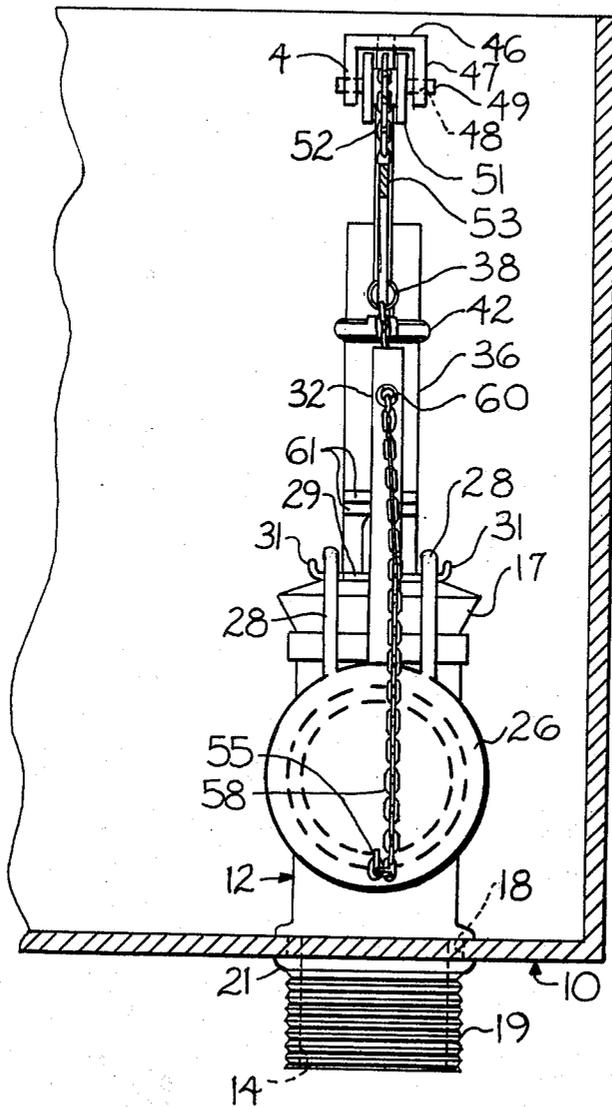
[57] **ABSTRACT**  
 A flush valve assembly embodying an upstanding cylindrical member within the lower portion of a water closet tank with an inlet at the upper end and an outlet at the lower end. A lateral inlet is located below the first inlet and adjacent the bottom of the tank with the bore of said cylindrical member and both inlets being at least as great as the bore of the outlet. A valve closes the first inlet and a depending flap valve closes the lateral inlet. Actuating means opens the valves selectively to discharge selectively minor and major portions of the contents of the tank.

1 Claim, 2 Drawing Figures





**Fig. 1**



**Fig. 2**

## FLUSH VALVE ASSEMBLY

### BACKGROUND OF THE INVENTION

This invention relates to a flush valve assembly for a water closet tank and more particularly to such a valve assembly which will permit discharge of the entire contents of the tank or a portion thereof, as desired.

Heretofore in the art to which my invention relates, difficulties have been encountered in providing means for flushing water closet tanks whereby a minor portion of the contents of the tank is discharged rapidly upon opening one valve and a major portion of the contents of the tank is discharged at substantially the same rate as the rate of discharge of the minor portion upon actuating of another valve. Prior art devices heretofore employed have attempted to bring about a discharge of a minor portion of the contents of the tank by providing valve means for discharging water through the lower portion of the usual overflow pipe. Many of these valve units are mounted directly on the overflow pipe or an additional pipe is mounted alongside the overflow pipe and communicates with the usual discharge passageway which communicates with the overflow tube. In actual practice, I have found that such valve units are entirely unsatisfactory due to the fact that there is a substantial restriction in the bore of the passageway which communicates the overflow tube with the outlet for the water closet tank. For example, where it is desired to provide a minor flush or from one to one and one-half gallons of water, the water must leave the tank in approximately seven seconds. Since the restricted bore in the discharge passageway leading from the overflow tube to the main outlet for the water closet tank restrains flow of the water therethrough, a relatively small amount of water is discharged during the time interval permitted for such discharge. That is, at the time the control valve for the minor flush seats itself, only a small amount of water has passed through the restricted bore which leads to the main discharge outlet for the water closet. Furthermore, with prior art double flush valves for water closets, the restricted bore leading to the main outlet cannot be enlarged due to the fact that this would elevate the point of discharge for the main flush whereby an excessive amount of water would be left in the bottom of the tank. That is, the structure and valve arrangements of prior art double flush units are not adapted for modification to bring about my improved assembly wherein a substantial amount of water is discharged during the minor flush and the usual amount of water is discharged from the tank during the major flush.

### BRIEF SUMMARY OF THE INVENTION

In accordance with my invention, I provide an upstanding cylindrical member within the lower portion of the water closet tank. The cylindrical member has an inlet at the upper end thereof and an outlet at the lower end thereof with a lateral inlet located between the first inlet and adjacent the bottom of the tank with both inlets being of a bore at least as great as that of the outlet. A valve member closes the inlet at the upper end of the cylindrical member and a depending flap valve closes the lateral inlet with the flap valve being adjacent the bottom of the tank to permit maximum discharge of water from the tank during the major flush and at the same time permitting the bore in the passageway for the minor flush to discharge water at the same rate as

the water is discharged through the outlet for the major flush. Improved actuating means opens the valves for the upper inlet and lateral inlet selectively to discharge selectively minor and major portions of the contents of the tank.

### DESCRIPTION OF DRAWINGS

Apparatus embodying features of my invention is illustrated in the accompanying drawings, forming a part of this application, in which:

FIG. 1 is a vertical sectional view through a water closet tank showing my improved flush valve assembly mounted therein, parts being broken away and in section; and,

FIG. 2 is a sectional view taken generally along the line 2—2 of FIG. 1.

Referring now to the drawings for a better understanding of my invention, I show a conventional type water closet tank 10 wherein the water level is maintained at a predetermined level 11 by a conventional type water supply unit and float valve, not shown. Since such mechanism is well known in the art to which my invention relates, no further description thereof is deemed necessary.

Mounted within the lower portion of the tank 10 is an upstanding, generally cylindrical member 12 having a water inlet 13 at the upper end thereof and a water outlet 14 at the lower end thereof. An annular valve seat 16 surrounds the inlet 13 and is adapted to receive a valve member 17 which is adapted to move selectively to a lower closed position in sealing engagement with the valve seat 16 to an upper open position. The valve member 17 may be a ball-type valve member or other conventional type valve. The lower end of the cylindrical member 12 extends through a suitable opening 18 provided in the bottom of the tank 10. External threads 19 are provided on the bottom of the tank 10. External threads 19 are provided on the lower portion of the cylindrical member 12 for receiving a retaining nut 21 whereby the cylindrical member 12 is secured to the tank 10 with a water-tight fit. As shown in FIG. 1, the bore throughout the entire length of the upstanding cylindrical member 12, including the inlet 13 is of the same internal diameter as the outlet 14 whereby there is no restriction of flow to the outlet 14.

As shown in FIG. 1, a laterally disposed inlet 22 communicates with the bore through the upstanding member 12 and is of an internal diameter equal the internal diameter of the outlet 14. Preferably, the inlet 22 is formed in a short cylindrical member 23 which may be formed integrally with the side of the upstanding cylindrical member 12 or may be formed as a separate member and secured to the upstanding cylindrical member 12 by suitable means to provide a fluid tight joint therebetween. An annular valve seat 24 surrounds the inlet 22 in position to be engaged by a depending flap valve 26. As shown in FIG. 1, the flap valve 26 is provided with a semi-spherical portion 27 which is adapted to move inwardly of the inlet 22 while the flap valve 26 is in the closed position, as shown in solid lines in FIG. 1. The flap valve 26 is formed of a resilient material and is provided with spaced apart, upstanding arms 28 which are also formed of the resilient material. Suitable openings are provided adjacent the ends of the upstanding arms 28 for receiving the end portions of a transverse bar 29 having upturned end portions 31. The transverse bar 29 is secured rigidly to an upstanding

support member 32 which is secured rigidly at its lower end to the short cylindrical member 23. The flap valve 26 is installed by merely inserting the ends of the transverse rod 29 through the openings in the resilient arms 28 whereby the upturned ends 31 retain the arms 28 in place as the flap valve 26 moves from the closed position shown in solid lines in FIG. 1 to the open, dotted line position.

As shown in FIG. 1, the upstanding cylindrical member 12 is provided with a laterally extending member 33 having a passageway 34 therethrough which communicates with the interior of the upstanding cylindrical member 12. An overflow tube 36 extends into a suitable passageway provided in the lateral member 33, as shown in FIG. 1, whereby the lower end of the overflow tube 36 communicates with the passageway 34 for passing overflow water into the interior of the upstanding member 12.

Secured to the top of the valve member 17 is the lower end of a rod-like member 37 having an eye 38 at the upper end thereof. The rod-like member 17 passes through a suitable opening 39 provided in a support bracket 41 having an annular portion 42 which surrounds the overflow tube 36 and is secured thereto by a suitable retaining screw 43. Secured to the support bracket 41 and projecting upwardly therefrom is a support bracket 44 having a laterally extending upper end portion 46. Depending, spaced apart supports 47 are carried by the end portion 46. Suitable openings 48 are provided in the depending supports 47 for receiving a transverse shaft 49 which carries a pulley 51.

Secured to the eye 38 of the rod-like member 37 is the lower end of a flexible member 52, such as a chain, which passes around the pulley 51 with the other end of the flexible member 52 being secured to the free end of an elongated actuating arm 53. The other end of the actuating arm 53 is secured to a shaft-like member 54 which extends through the wall of the tank 10 and is mounted for rotation relative thereto whereby the free end of the elongated actuating arm 53 is adapted for movement in opposite directions. A suitable actuating handle 56 is secured to the shaft-like member 54 for moving the elongated arm 53 in opposite directions. Accordingly, upon moving the handle member 56 in a counterclockwise direction, as viewed in FIG. 1, the free end of the elongated arm 53 is moved downwardly to thus move the flexible member 52 around the pulley 51 and thus lift the rod-like member 37 whereupon the valve member 17 is lifted to permit water to flow through inlet 13 into the upstanding member 12 and then out through the outlet 14. Upon opening the valve member 17, water continues to flow through the inlet 13 until it reaches the level indicated by dotted line 57. The valve member 17 being of the conventional type reseats itself to interrupt the flow of water through inlet 13 whereupon the water level in the tank 10 moves back to the usual level indicated by dotted line 11.

Formed integrally with the flap valve 26 is an outwardly projecting eye member 55 for receiving the lower end of a flexible member 58, such as a chain. The upper end of the chain 58 passes through an opening 60 provided through the upper portion of member 32 and is connected to the elongated actuating arm 53 adjacent the free end thereof, as shown. Accordingly, upon clockwise movement of the actuating handle 56, as viewed in FIG. 1, the free end of the elongated arm 53 is raised to thus lift the flap valve 26 from the solid

line position shown in FIG. 1 to the dotted line position whereupon water then flows through the inlet 22 and is then discharged through the outlet 14. The water level then moves downwardly to the level indicated by dotted line 59 whereupon the flap valve 26 reseats itself and the tank 10 is then refilled in the usual manner to the level 11.

Where it is desired to vary the time that the valve member 17 remains in open position, I provide washer-like weight members 61 which are adapted to telescope over the rod-like member 37 and rest on an upper portion of the valve member 17, as shown in FIG. 1. Accordingly, to make the valve member 17 close quicker, weights 61 are added. On the other hand to retain the valve member 17 in open position for a longer period of time, the weights 61 are removed.

From the foregoing description, the operation of my improved flush valve assembly will be readily understood. When it is desired to flush a minor portion of the contents of the tank 10, the actuating handle 56 is moved in a counterclockwise direction to lower the free end of the actuating arm 53 whereupon the flexible member 52 moves about the pulley 51 to lift the valve 17. Water flows rapidly through the inlet 13 and then through the outlet 14 due to the fact that there are no restrictions throughout the entire length of the upstanding cylindrical member 12. The water level is then lowered to the dotted line position 57 as the valve member 17 reseats itself. The tank 10 is then refilled to the level indicated by dotted line 11. When it is desired to discharge a major portion of the contents of the tank 10, the actuating handle 56 is moved in a clockwise direction, as viewed in FIG. 1, to lift the free end of the arm 53 whereupon the flexible member 58 lifts the flap valve 26 to the dotted line position. Water then flows rapidly through the inlet 22 and then out through the outlet 14 due to the fact that the inlet 23 is of the same internal diameter as the bore of the upstanding cylindrical member 12 and the outlet 14. As the water approaches the lower level indicated by the dotted line 59, the flap valve 26 reseats itself and the tank 10 is then refilled in the usual manner.

From the foregoing, it will be seen that I have devised an improved flush valve assembly for a water closet tank. By providing the upstanding cylindrical member 12 with an internal bore throughout the length thereof which is of an internal diameter at least as great as the outlet 14 and providing the inlet 22 with a bore at least as great as the outlet 14, water flows rapidly through the inlets 13 and 22 to discharge the desired amounts of water whereupon the tank 10 is then refilled to the full position indicated by dotted line 11. By providing a depending flap valve 26 which is pivotally connected above the inlet 22, a minimum of vartical space is required for operation of the valve whereby the inlet 22 may be positioned to discharge the usual amount of water where a major flush is desired and at the same time the minor flush valve 17 and inlet 13 are at an elevation to discharge the desired amount of water for a minor flush. Furthermore, by providing a pulley and chair arrangement for actuating the minor flush valve 17, the minor flush is obtained by rotating the actuating handle 56 in one direction while the major flush is obtained by rotating the actuating handle 56 in the opposite direction. Furthermore, in accordance with my improved construction, the entire flush valve assembly may be mounted in conventional type water closet

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tanks with a minimum of effort and cost whereby there will be a substantial saving in the amount of water used to flush water closets. This is especially true in view of the fact that in most cases, only a minor flush is required.

While I have shown my invention in but one form, it will be obvious to those skilled in the art that it is not so limited, but is susceptible of various other changes and modifications without departing from the spirit thereof.

What I claim is:

- 1. In a flush valve assembly for a water closet tank,
  - a. an upstanding generally cylindrical member within said tank and having a first inlet at the upper end thereof for receiving water and an outlet at the lower end thereof for discharging water adjacent the bottom of said tank with the bore throughout said upstanding member, including said first inlet, being at least as great as the bore of said outlet,
  - b. a first valve seat surrounding said first inlet,
  - c. a first valve member disposed to move selectively to a lower closed position in sealing engagement with said first valve seat and to an upper open position,
  - d. a laterally disposed inlet for said upstanding member located within said tank at an elevation below said first inlet and adjacent the bottom of said tank with the bore of said laterally disposed inlet being at least as great as the bore of said outlet,
  - e. a second valve seat surrounding said laterally disposed inlet,

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- f. a depending flap valve member pivotally supported for movement selectively to a lower closed position in sealing engagement with said second valve seat and to an upper open position,
- g. an elongated arm pivotally connected adjacent one end to said tank with the other end thereof being movable in opposite directions,
- h. a pulley-like member mounted above said first valve member,
- i. a first flexible member connected at one end thereof to said first valve member and connected at the other end thereof to said elongated arm adjacent said other end thereof with the intermediate portion of said first flexible member passing over said pulley-like member,
- j. a second flexible member connected at one end thereof to said depending flap valve and connected at the other end thereof to said elongated arm adjacent said other end thereof, and
- k. a handle member outwardly of said tank and operatively connected to said elongated arm for pivoting said elongated arm in said opposite directions so that downward movement of said other end of said elongated arm opens said first valve member and upward movement of said other end of said elongated arm opens said flap valve so that upon opening said first valve member a minor portion of the contents of said tank is discharged and upon opening said flap valve member a major portion of the contents of said tank is discharged.

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